REMARKS

Reconsideration is respectfully requested in light of the amendments and remarks which follow.

Claims 1-41 are pending. Claims 1-13, 15-22 and 26-41 stand withdrawn from consideration. Claims 14 and 23-25 are rejected.

Claims 14 and 23 have been amended. As amended, both claims specify an average particle diameter for the silver powder. Support for the change can be found on page 15 starting at the ninth line from the top and in the examples. In addition, X^3 in compound D is limited to -O-. Support for this amendment appears in the examples.

Rejection under 35 U.S.C. § 103(a)

Claims 14 and 23-25 are rejected under 35 U.S.C. § 103(a) as unpatentable over *Herr* (US 6,265,530) in view of *Sakurai* (JP 2003-0490939). Applicants respectfully traverse.

The focused in the Office Action has been compound B (bis-maleimide) as shown in formula (3). Before addressing the rational provided in the Office Action for the structural obviousness of the claimed bis-maleimide, it is again asserted that the four component composition, as claimed is not suggested by the art relied upon. Claims 14 and 23 have three common components including the bis-maleimide- a silver powder, and a thermal initiator C. The compositions differ as to Polymerizable compound (D) and allyl ester compound (G). Photopolymerization initiators are not desired in either composition as described by claim 14 or claim 23- "substantially not containing."

Herr teaches a thermoplastic or thermosetting curable adhesive which allows them to be reworked without destruction of the substrate. Cross-link density is controlled to attain the desired thermoplastic/thermosetting properties. Free-radical initiators (thermal) and photoinitiators are taught as suitable. The taught maleimides have either generic formula: $[M\text{-}X_m]_n\text{-}Q$ or $[M\text{-}Z_m]_n\text{-}K$. The possibilities for M, X, Q, Z and K are quite varied and include cyclic heterocycles, siloxanes, esters, etc. As urged below, there is no guidance/motivation

which would lead to the selections needed to arrive at the structure from which Examiner proposes modifications.

Sakurai (abstract (IDS), machine translation (PTO)) describes the need to provide an active energy-ray curable composition capable of curing with a content of a maleimide derivative, with inexpensive production cost. The active energy-ray curable resin composition taught by Sakurai abstract contains a radical-polymerizable compound having at least one methine or methylene group having a bonding energy between a carbon atom and a hydrogen atom (C-H bond energy) of 272-314 kJ/mol, at least one radical-polymerizable group and at least one urethane bond (A) and a maleimide derivative (B). The machine translation of the JP 2003-040939 document provided by the Office mentions utilities such as paint and properties such as gel fraction of paint film and pencil hardness. The taught aliphatic series of maleimide derivatives, which vary in the number of organic functions, includes Chemical formula 3 and 4. Both formulas include ester functionalities, which are symmetric about $-(CH_2C(R)HO)_n-$ and $-(CH_2CH_2CH_2C(R)HO)_n-$, respectively. These moieties are not polyethers as required by the claims. (It is not clear why an ether would be suggested by an aliphatic teaching without more. Further, some motivation for the substitution is required.)

On its face, it is not seen why one would combine *Sakurai* with *Herr*. The technologies differ- paint films v. workable conductive adhesives, suited for use in electronic applications. It appears that the references were combined relying on applicants' specification. It is not seen that the solution of ultra violet initiators and lower amounts of maleimides, both desired for the *Sakurai* application, is suited for the *Herr* applications. The mere existence of a "chemistry" does not suggest its application for a specific purpose.

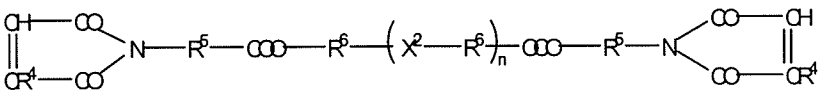
Compound (B)

The compound (B) is the bismaleimide compound (B') having the structure represented by the formula (3). As described in the last response, the bismaleimide compound (B') shows good cross-linking reactivity, good adhesion to hardly-adhesive metal surfaces, a good balance between the effects of increasing the adhesion of the resin composition and not increasing the viscosity of the same, low crystalline property, the effect of preventing deterioration in the thermal conductivity of a cured product of the resin composition due to the use of a polar solvent, etc. The bismaleimide compound (B') has a polyether structure that contains a –O–

group as X^2 in the formula (3), so that the resin composition is likely to be liquid and a cured product thereof has excellent low stress property.

The bismaleimide compounds disclosed in Herr are a wide variety of bismaleimide compounds and include, as a preferable example, a maleimide compound having an aromatic ring, which is considered not preferable in the present invention and excluded therefrom, and those that have a siloxane structure or urethane structure, both of which being very different from the structure of the maleimide compound of the present invention.

In contrast to this, in the present invention, the maleimide compound used is the bismaleimide compound (B') represented by the following formula (3):



(3)

wherein X^2 is –O–; each R^4 is hydrogen atom or a methyl group; each R^5 is a hydrocarbon group having 1 to 11 carbons and containing no aromatic group; each R^6 is a hydrocarbon group having 3 to 6 carbons and containing no aromatic group; "n" is an integer of 1 or more and 50 or less; and if the formula contains two or more parts which are denoted by the same symbol, each of them may be the same or different from each other.

The bismaleimide compound (B') has two maleimide groups. Therefore, when compared to the case of having one maleimide group, it is able to increase the effect of increasing the adhesion of the resin composition; moreover, when compared to the case of having three or more maleimide groups, it is able to increase the effect of not increasing the viscosity of the resin composition.

In the bismaleimide compound (B'), no aromatic ring is contained in the group which connects the two maleimide groups; therefore, the bismaleimide compound (B') shows low crystalline property, so that the resin composition is in liquid form and it is not necessary to use a solvent. Furthermore, the bismaleimide compound (B') has excellent affinity for general liquid vinyl compounds and can be diluted with vinyl compounds. As a result, it is able to prevent generation of voids in a cured product of the resin composition, which is due to volatilization of a solvent, and provides a cured product with excellent thermal conductivity.

Also in the bismaleimide compound (B'), R^6 is a hydrocarbon group having 3 or more carbons, so that it is able to prevent deterioration in the water absorption property of the cured product and to make

deterioration in the properties of the resin composition (e.g., adhesion) under severe condition in water treatment such as a pressure cooker test (PCT). Meanwhile, R^6 is also a hydrocarbon group having 6 or less carbons, so that it is able to prevent deterioration in the adhesion of the resin composition to metal surfaces that are likely to be oxidized, such as copper, which is due to the reason that the resin composition becomes too much hydrophobic. In addition, the resin composition is able to keep low crystalline property.

Also in the bismaleimide compound (B'), X^2 is –O–, so that the cured product shows flexibility and shows excellent low stress property. Moreover, the fact that X^2 is –O– is also very important for the bismaleimide compound (B') to be in liquid form and to be highly soluble in other components.

Also in the bismaleimide compound (B'), the repeating number "n" of polyether is 50 or less, so that it is able to obtain a resin composition with viscosity that is practically preferable.

Also, the bismaleimide compound (B') helps adhesive resin compositions comprising a filler (especially silver powder) to show excellent flowability and excellent adhesion.

In Sakurai, there is no motivation that leads from the maleimide compounds disclosed in Sakurai to the identification of the structure of the bismaleimide compound (B') of the present invention, from the above viewpoints of the present invention. Also in Herr et al., there is no motivation that leads to the identification of the structure of the same from the viewpoints of the present invention.

Therefore, a person of ordinary skill in the art cannot easily conceive replacing, in the adhesives disclosed in Herr et al., the bismaleimide compound with the bismaleimide compound (B') of the present invention even though the person refers to Herr in view of Sakurai.

Further, it is clear from the additional data which is described in the enclosed Rule 132 Declaration (Reference Examples A1' to A1''') that in the case of comprising, in place of the compound (B') of the present invention, the compounds 1' to 1''' which are encompassed in the maleimide compounds described in the cited references (Herr et al. and Sakurai et al.) and do not correspond to the compound (B') of the present invention, there are an increase in the viscosity of the composition, a large decrease in the adhesion after a PCT and a decrease in the solder crack resistance. This is because the compounds 1' to 1''' are highly crystalline and have extremely low solubility in other resins. In contrast, Examples A1 to A4 (the same data as A1 to A4 in Table 1 of the original specification) have low viscosity, keeps adhesion even after a PCT, and has excellent solder crack resistance.

The compound 1' corresponds to a bismaleimide described in Herr et al., in which X has a structure represented by the formula (I) and Q= $-CH_2-$. Also, the compound 1' is N,N-(4,4'-

diphenylmethane) bismaleimide that is exemplified in paragraph [0049] of Sakurai et al. as the polyfunctional aromatic maleimide (B-4).

The compound 1'' corresponds to a bismaleimide described in Herr et al., in which Q=Ph(Me)(Et)–CH2-Ph(Me)(Et)–. Also, the compound 1'' is encompassed in the polyfunctional aromatic maleimide (B-4) of Sakurai et al.

The compound 1''' corresponds to a bismaleimide described in Herr et al., in which X has a structure represented by the formula (I) and Q=–O–Ph–C(Me)(Me)–Ph–O–. Also, the compound 1''' is encompassed in the polyfunctional aromatic maleimide (B-4) of Sakurai et al.

Even if a person of ordinary skill in the art refers to Herr et al., and Sakurai, it is not possible for the person to expect that a curable resin composition as described above, which keeps adhesion strength and shows excellent low viscosity and excellent solder crack resistance, is obtained by using the compound (B') having the structure specified in the present invention.

Accordingly, it should be clear that a proper prima facie case has not been established.

Also, relative to the completeness of the teachings provided by the art relied upon, it should be noted.

Silver Powder (A)

The silver powder (A) having an average particle diameter of 1 to 30 μm is not disclosed in any of the above cited references. As described on page 15 of the specification, by using the solver powder having an average particle diameter in the above range, it is able to obtain a resin composition that has preferable viscosity and is able to prevent dispensing nozzles from clogging, etc. This particle range is not taught or suggested by the applied art.

Compound (D)

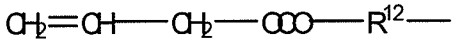
Now, the compound (D) is specified such that X_3 in the formula (4) is –O–.

To be the compound (D) of the present invention, the vinyl compound disclosed in Herr et al. and represented by [R1-CH=CR2-B-Xm]n-Q has to be such that when R1=R2=H, m=0 and B=C, Q contains a polyether chain [–(R-O)n–]. However, Herr failed to disclose or suggest Q that contains the polyether chain [–(R-O)n–].

Compound (G) (Claims 23, 24 and 25)

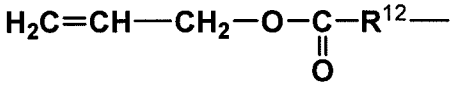
The Examiner urge that when, in the vinyl compound [R1-CH=CR2-B-Xm]n-Q disclosed in Herr, R1=R2=H, m=0, B=C and Q=-R3-OC(O)-R3-(CO)O-R3-[-OC(O)-R3-(CO)O-R3-]p-, the vinyl compound corresponds to the compound (G) of the present invention, However, because of the following reason, B is never C (B≠C) in the vinyl compound of Herr.

The allyl ester compound (G) of the present invention has a structure represented by the following formula (8):

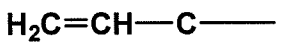


(8)

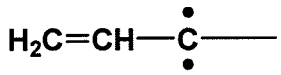
that is,



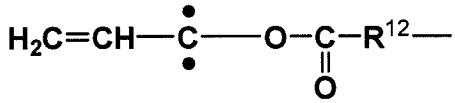
As urged by the Examiner, when R1=R2=H, m=0, and B=C in the vinyl compound [R1-CH=CR2-B-Xm]n-Q of Herr, the vinyl compound must have a structure represented by:



Since C (carbon) has four bonds, two of them are dangling bonds in this structure. If m=0 and there is no X, what is connected to B is R_3 that is at a terminal end of Q, and R_3 is an alkyl or alkyloxy. In this case, the vinyl compound disclosed in Herr et al. should have the following structure:



This structure is not chemically possible, however. In addition, the following structure is not chemically possible:



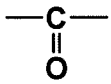
The structure in which B=C is [R1-CH=CR2-B≡Xm]n-Q only. This is a structure that is chemically different from the allyl ester compound of the present invention, however.

Furthermore, in Herr et al., there is a description that indicates B=C; however, there is no description that indicates B=CR_2 or B is an alkyl such as –CH2–. Also in Herr et al., C(O) is also exemplified as B, and C and C(O) are clearly differentiated from each other. Therefore, it is possible to understand that in Herr, no alkyl group such as –CH2– or –CR_2– is contained in C of

B=C. As just described, in the vinyl compound of Herr et al., no alkyl group is intended as B; therefore, the Examiner's comments on the vinyl compound (the vinyl compound corresponds to the compound (G) of the present invention) seems to be misplaced.

This is also true for compound (D) of the present invention.

Also in Q, R_3 is an alkyl or alkyloxy. That is, R_3 is –CnH2m– or –OCnH2m–. However, to make [R1-CH=CR2-B-Xm]n-Q an allyl ester, R_3 of Q has to contain:



However, R_3 cannot be an alkoxy. Therefore, the allyl ester compound (G) of the present invention is not disclosed in Herr et al.

Accordingly, withdrawal of the rejection is respectfully requested. A proper prima facie case of obviousness has not been established. The enclosed Rule 132 declaration establishes unexpected benefits for the invention as claimed.

Claims 14 and 23-25 are rejected under 35 U.S.C. § 103(a) as unpatentable over *Herr* (US 6,265,530) in view of *Hoyle* (US 6,034,150). Applicants respectfully traverse.

The deficiencies of Herr are discussed above. It is submitted that these deficiencies are not remedied by *Hoyle*.

Hoyle is directed to process for radiation curing of photopolymerizale compounds using malemides capable of initiating photopolymerization of radiation curable compounds, in place of conventional photoinitiators. The maleimides useful in the Hoyle process have the formula depicted in formula 1. The maleimide can be substituted and the nitrogen is linked to a function group (FG) by an R group. A number of linking groups R are suggested and include a C1-C10 alkyl group (c1), hetero or silicon atom (c2) and a linking group involving an additional maleimide group(s).

The closest structure to that claimed is the (c1) linker. None of the possibilities for (c1) include a polyether linker. (Again, it is not seen why a polyether would be suggested by an aliphatic teaching, without more. Motivation for the substitution is also required.)

For the reasons set forth here and above, the art, taken alone or in combination, fails to establish a proper prima facie case for obviousness.

As above, the results presented in the enclosed Rule 132 Declaration should be considered.

Withdrawal of the rejection is respectfully requested. Favorable action at the Examiner's earliest convenience is respectfully requested.

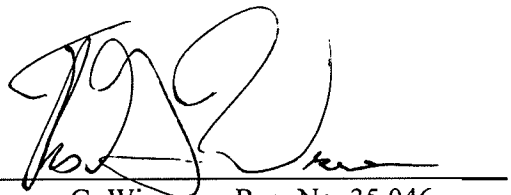
CONCLUSION

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Therefore, it is respectfully requested that the Examiner reconsider all presently outstanding rejections and that they be withdrawn. It is believed that a full and complete response has been made to the outstanding Official action and, as such, the present application is in condition for allowance. If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at the number provided.

It is not believed that extensions of time are required, beyond those that may otherwise be provided for in accompanying documents. However, in the event that additional extensions of time are necessary to prevent abandonment of this application, then such extensions of time are hereby petitioned under 37 C.F.R. 1.136(a), and any fees required therefor are hereby authorized to be charged to **Deposit Account No. 02-4300, Attorney Docket No. 033036.110.**

Respectfully submitted,

SMITH, GAMBRELL & RUSSELL, LLP



By: _____

Thomas G. Wiseman, Reg. No. 35,046
Suite 1130
1130 Connecticut Avenue, N.W.
Washington, D.C. 20036
Telephone: (202) 973-2612
Facsimile: (202) 263-4317

Date: November 24, 2010

SGR\8592741.1